



ANALYSIS OF NOISE QUALITY FOR ENVIRONMENTAL MANAGEMENT: A MODEL STUDY FROM TELANGANA STATE

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ABSTRACT

Due to Urbanization and Industrialization noise pollution has been increased in this connection this study area has been carried out on Noise levels. The baseline environment quality represents the background environmental scenario of various environmental components during the study period. The baseline quality monitored reflects the environment status from the existing activities and other local activities within 10 km radius of the study area. Noise level study with sampling periods and frequencies are taken by sound level meter and noise dosimeter. In this study we have been identified that the maximum values of Noise quality levels are obtained in Saravaram village.

Key words: Noise Levels, Sound Level Meter.

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1. INTRODUCTION

The increase in population, urbanization, and the associated growth in the use of increasingly powerful, varied, and highly mobile sources of noise. It will also continue to grow because of sustained growth in highway, rail, and air traffic, which remain major sources of environmental noise. The measurements of wind speed and direction, temperature, humidity, rainfall and solar radiation are important parameters used in the study of noise levels monitoring results and to further understand the chemical reactions that occur in the atmosphere. Meteorological monitoring is used to predict air pollution events such as inversions, high pollutant concentration days and to simulate and predict noise levels using computer models. When the likely source or sources have been identified they can then be managed to reduce the impacts on noise levels. The measurement of meteorological parameters is important to gain an understanding of the impacts of a region's meteorology on noise pollutant concentrations, the prediction of inversions, and for the study of wind field and dispersion modelling.

1.1 DESCRIPTION OF STUDY AREA

1.2 TOPOGRAPHY

The study area is located at Khammam district in Telangana. The area is covered in part of survey of India Topographical sheet Nos. 65 C/6, 7, 10 and 11. The study area is well connected to kothagudem (5km) and the Khammam (80km), The district head quarters by the state highways. The study area is parts of the district are mainly hilly, Godavari, Tungabhadra and Khammam has the largest area under forests.

1.3 RAINFALL AND TEMPERATURE

Study area has a tropical climate. The summer here have a good deal of rainfall while the winters have very little. The average annual temperature is 28.1°C. precipitation here averages 1046 mm. The difference in precipitation between the driest month and the wettest month is 281 mm. throughout the year, temperatures vary by 112°C. the diversity of the physical features results in a corresponding diversity of climate.

2. OBJECTIVES

- Collection of the noise samples and analysis.
- To estimate the impact of noise levels in proposed site due to the proposed extinction activity of thermal power plant.

3. METHODOLOGY

The acoustical environment varies dynamically in magnitude and character throughout most communities. The noise level variation can be temporal, spectral and spatial. The residential noise level is that level below which the ambient noise does not seem to drop down during the given interval of time and is generally characterized by unidentified sources. Ambient noise level is characterized by significant variations above a base or a residential noise level. The maximum impact of noise is felt on urban areas, which is mostly due to the commercial activities and vehicular movement during peak hours of the day. Measured noise level displayed as a function of time provides a useful scheme for describing the acoustical climate of a community. Noise levels recorded at each station with a time interval of about 30 minutes are computed for equivalent noise levels. Equivalent noise level is a single number

descriptor for describing time varying noise levels. The equivalent noise level is defined as mathematically

$$10 \log_{10} \left(\frac{1}{T} \sum_{i=1}^N 10^{L_i/10} \right)$$

Where L = sound pressure level a function of time dB (A) T = Time interval of observations

Noise levels during the night time generally drop, therefore to compute Equivalent noise levels for the night time, noise levels are increased by 10 dB (A) as the night time high noise levels are judged more annoying compared to the day time. Noise levels at a particular station are represented as Day-Night equivalent (L_{dn}). Day-Night equivalent is the single number index designed to rate environmental noise on daily/24 hourly basis. Mathematically L_{dn} is given by

$$L_{dn} = 10 \log \left\{ \frac{1}{24} (15 \times 10^{(L_d/10)} + 9 \times 10^{(L_n+10)/10}) \right\}$$

Where L_d = A weighed equivalent for day time period (6 am to 9 pm)

L_n = A weighed equivalent for night time period (9 pm to 6 am)

In order to know the baseline noise levels, in and around the proposed mine site, Noise levels were measured at the surrounding villages in the study area. The noise recording stations are shown in Fig-1 and the summary of noise levels in the study area is given in Table-2.

The day equivalent noise levels were found to be relative high due to local activities in the villages. Noise levels recorded in the night time were found to be less. In order to assess the noise levels in the study area, monitoring was carried out at 4 different locations within 10 km radius of the study area. Noise levels were recorded at each station with a time interval of one minute for about 30 minutes in each hour and were computed for equivalent noise levels for day-equivalent, night-equivalent & day-night equivalent.

Details of noise monitoring stations are given below and are shown in Fig – 2.

Table 1 Noise Monitoring Stations

Station Code	Location	Distance Wrt Plant (Km)	Direction w.r.t plant	Predominant Activity
N1	Hemachandrapuram Village	1.6	NNE	Vehicular movement & local activities
N2	Sarvaram Village	1.7	SSW	
N3	Korukondaramavaram Village	2.5	WNW	
N4	Upperagudem Village	2.9	WSW	

Table 2 Ambient Air Quality Standards In Respect of Noise

Area code	Category of area	Limits in dB(A) Leq	
		Day time	Night time
A	Industrial area	75	70
B	Commercial area	65	55
C	Residential area	55	45
D	Silence zone	50	40

1. Daytime is reckoned in between 6 a.m and 9 p.m
2. Night time is reckoned in between 9 p.m and 6 a.m
3. Silence zone is defined as areas up to 100metres around such premises as hospitals, educational institutions and courts. The silence zones are to be declared by the competent authority. Use of vehicular horns, loud speakers and bursting of crackers shall be banned in these zones.
4. Mixed categories of areas should be declared as one of the four above mentioned categories by the Competent Authority and the corresponding standards shall apply.

3.1. Noise Levels within 5 Km Radius

The day equivalent noise levels were found relatively high in stations having vehicular activities and due to local activities in the villages. Noise levels recorded in the night-time were found to be less than 42.5dB (A).

Table 3 Noise Levels In The Study Area

Location	Code	Noise level dB (A)		
		Day Equivalent	Night Equivalent	Day-Night Equivalent
Hemachandrapuram Village	N1	45.6	35.8	45.7
Sarvaram Village	N2	49.2	35.4	48.1
Korukondaramavaram Village	N3	45.5	34.2	45.1
Upperagudem Village	N4	47.2	35.2	46.6

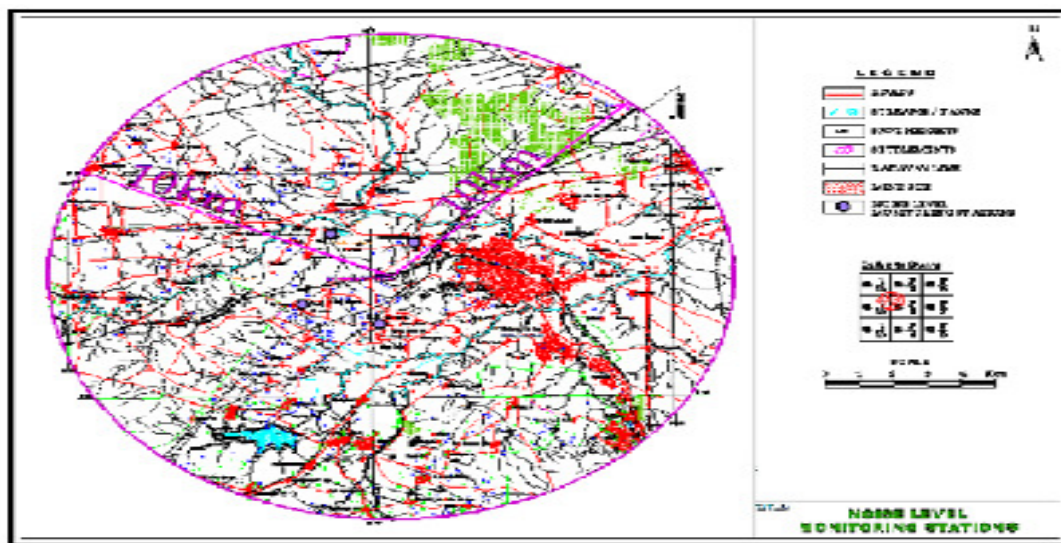


Figure 2 Noise Level Monitoring Stations

4. RESULTS AND DISCUSSION

4.1. Micro Meteorology of The Study Area

An auto weather monitoring station was installed during the summer season 2016 to record various meteorological parameters on hourly basis to understand the wind pattern, Temperature variation, solar isolation and relative humidity variation etc. Percentage

frequencies of wind in 16 directions have been computed from the recorded data during the study period for 8 and 24 hourly intervals to plot wind roses.

Table 4 Summary of Wind Pattern

Duration(HRS)	Predominant Wind Direction	Wind Speed KMPH	Wind Rose Enclosed As
00:00-8:00	W to NNW Sector	5-20	Fig 1&2
08:00-16:00	W,SE,SSE&NW		
16:00-24:00	W,WNW,NW&E		
00:00-24:00	W to NNW Sector		

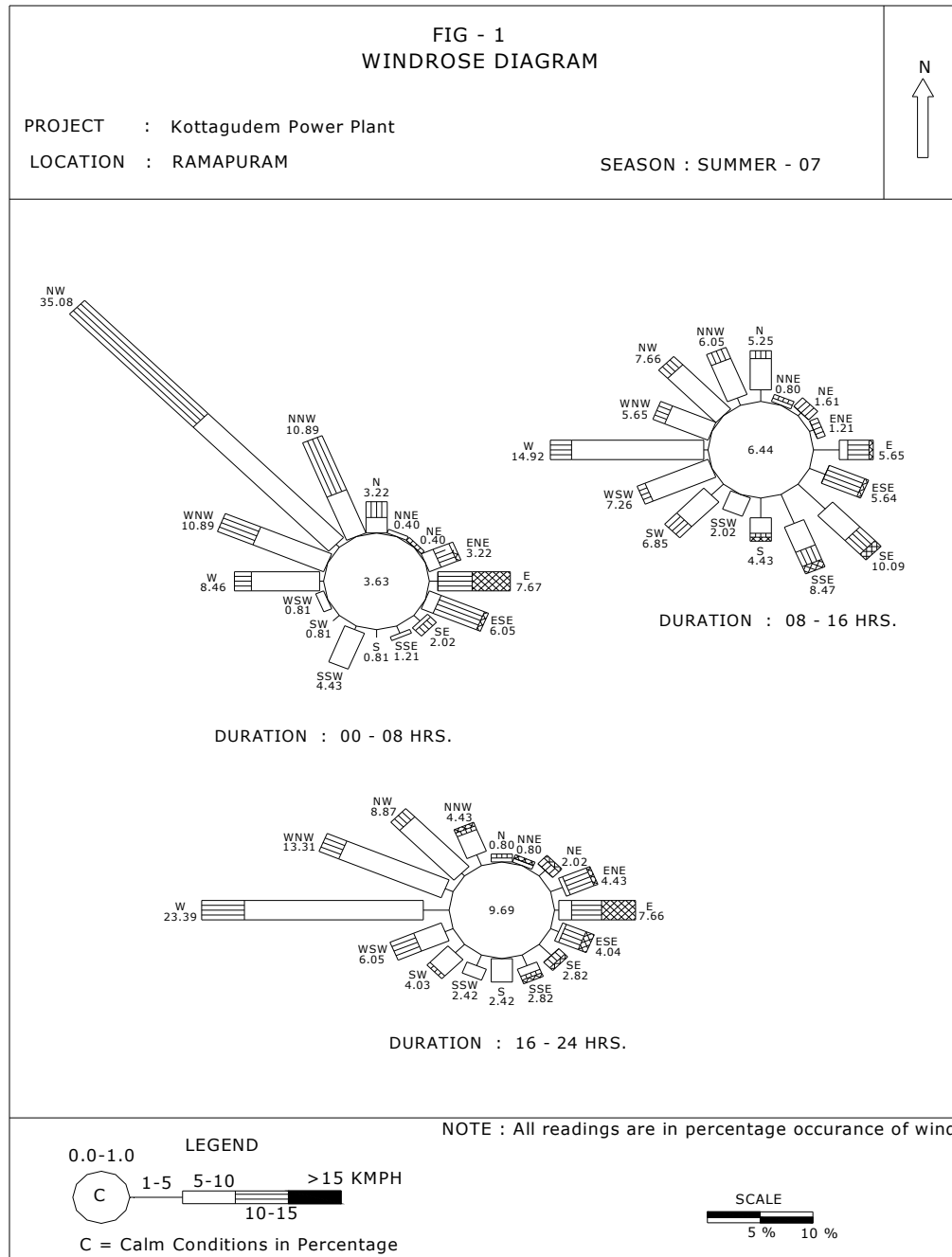


Figure 1 Wind Rose diagram.

Table 5 Noise Levels Analysis Data

s.no	Hemachandra Puram		Gollagudem village		Sarvaram village		Sccl colony	
	Time	Value in db(A)	Time	Value in db(A)	Time	Value in db(A)	Time	Value in db(A)
1.	7.00 A.M	36.8	7.30 A.M	35.9	7.00 A.M	36.3	7.30 A.M	35.3
2.	8.00 A.M	37.6	8.30 A.M	36.4	8.00 A.M	38.5	8.30 A.M	39.4
3.	9.00 A.M	38.2	9.30 A.M	37.9	9.00 A.M	42.6	9.30 A.M	40.7
4.	10.00 A.M	40.4	10.30 A.M	40.1	10.00 A.M	50.8	10.30 A.M	41.5
5.	11.00 A.M	41.5	11.30 A.M	42.5	11.00 A.M	50.9	11.30 A.M	46.9
6.	12.00 A.M	41.9	12.30 A.M	44.9	12.00 A.M	51.4	12.30 A.M	48.4
7.	1.00 P.M	47.7	1.30 P.M	50.3	1.00 P.M	51.6	1.30 P.M	48.5
8.	2.00 P.M	48.5	2.30 P.M	50.1	2.00 P.M	51.8	2.30 P.M	50.8
9.	3.00 P.M	50.4	3.30 P.M	49.9	3.00 P.M	51.1	3.30 P.M	51.4
10.	4.00 P.M	49.6	4.30 P.M	49.2	4.00 P.M	52.8	4.30 P.M	51.3
11.	5.00 P.M	48.4	5.30 P.M	47.3	5.00 P.M	51.9	5.30 P.M	50.9
12.	6.00 P.M	47.3	6.30 P.M	46.4	6.00 P.M	50.1	6.30 P.M	49.2
13.	7.00 P.M	46.2	7.30 P.M	39.6	7.00 P.M	48.7	7.30 P.M	42.7
14.	8.00 P.M	38.5	8.30 P.M	39.3	8.00 P.M	42.5	8.30 P.M	42.2
15.	9.00 P.M	38.1	9.30 P.M	36.9	9.00 P.M	39.7	9.30 P.M	48.5
16.	10.00 P.M	36.3	10.30 P.M	34.5	10.00 P.M	36.2	10.30 P.M	36.9
17.	11.00 P.M	36.6	11.30 P.M	34.6	11.00 P.M	35.6	11.30 P.M	36.6
18.	12.00 P.M	36.4	12.30 P.M	34.5	12.00 P.M	35.9	12.30 P.M	36.4
19.	1.00 A.M	36.3	1.30 A.M	34.1	1.00 A.M	35.6	1.30 A.M	35.6
20.	2.00 A.M	35.7	2.30 A.M	34.3	2.00 A.M	35.4	2.30 A.M	35.3
21.	3.00 A.M	35.8	3.30 A.M	34.2	3.00 A.M	35.9	3.30 A.M	34.5
22.	4.00 A.M	35.3	4.30 A.M	34.0	4.00 A.M	35.8	4.30 A.M	34.3
23.	5.00 A.M	35.2	5.30 A.M	34.4	5.00 A.M	35.9	5.30 A.M	34.2
24.	6.00 A.M	36.4	6.30 A.M	34.6	6.00 A.M	35.8	6.30 A.M	34.6

The maximum noise levels recorded at various locations are in hemachandrapuram at 3:00 pm the value is 50.4db,gollagudem village at 1:30 pm the value is 50.3db,saravaram village at 5:00 pm the value is 51.9db,sccl colony at 3:30 pm the value is 51.4db.

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